CLAIMS

What is claimed is:

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1. An NDO or NDO related complex comprising a plurality of polypeptides, wherein the complex comprises at least one alpha-subunit polypeptide that comprises: (1) a substituted amino acid at the position corresponding to position 352 in NDO, (2) a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO, or 3) a substituted amino acid at the position corresponding to position 352 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

2. The NDO complex of claim 1 having an alpha-subunit that comprises an amino acid other than phenylalanine at position 352, or a catalytically active fragment thereof.

3. The NDO complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at position 201, 202, 260, 316, 351, 352, 358, 362, or 366 or a catalytically active fragment thereof.

4. The NDO complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 352 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, 351, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.

5. The NDO related complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 352 in NDO; or a catalytically active fragment thereof.

6. The NDO related complex of claim 1 having an alpha-subunit that comprises a substituted amino acid at the position corresponding to position 201,

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202, 260, 3\6, 351, 352, 358, 362, or 366 in NDO; or a catalytically active fragment the eof.

- The NDO related complex of claim I having an alpha-subunit that 7. comprises a substituted amino acid at the position corresponding to position 352 5 in NDO, and a substituted amino acid at the position corresponding to position 201, 202, 260, 316, \$51, 358, 362, or 366 in NDO; or a catalytically active fragment thereof.
- The complex of claim 2 wherein the amino acid at position 352 is a 8. 10 naturally occurring amino acid.
 - The complex of claim 2 wherein the alpha-subunit has or comprises 9. SEQ ID NO:2, 32, 33, 34, 35, or 36.
 - The complex of claim wherein the alpha-subunit has or comprises SEQ 10. ID NO:2.
- The complex of claim 5 wherein the amino acid at the position 11. corresponding to position 352 in NDO has been substituted with a naturally 20 occurring amino acid.
 - The complex of claim 5 wherein the amino acid at the position 12. corresponding to position 352 in NDO has been substituted with valine.
 - The complex of claim 5 wherein the alpha-subunit has or comprises any 13. one of SEQ ID No's:14 to 24.
- An isolated and purified DNA segment comprising a DNA-sequence 14. encoding the polypeptide of any one of claims 1 to 13.

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- An expression cassette comprising a promotor operably linked to the DNA segment of claim 14.
- 16. A host cell, the genome of which is augmented by the DNA segment of 5 claim 14
 - 17. A method to produce a catalytically active polypeptide comprising culturing a host cell transformed with the DNA segment of claim 14 so that the host cell expresses the DNA segment.

18. A method for preparing (-)-(1S,2R)-cis-naphthalene dihydrodiol comprising contacting naphthalene with the complex of any one of claims 1 to 13.

- 15 19. A method for preparing (-)-(1S,2R)-cis-naphthalene dihydrodiol comprising contacting a host cell of claim 16 with naphthalene.
 - 20. A method for preparing (- or +)-cis-biphenyl-3,4-dihydrodiol comprising contacting biphenyl with the complex of any one of claims 1 to 13.
 - 21. A method for preparing (- or +)-cis-biphenyl-3,4-dihydrodiol comprising contacting a host cell of claim 16 with biphenyl.
- 22. A method for preparing (1S,2R)-cis-phenanthrene-1,2-dihydrodiol comprising contacting phenanthrene with the complex of any one of claims 1 to 13.
 - 23. A method for preparing (1S,2R)-cis-phenanthrene-1,2-dihydrodiol comprising contacting a host cell of claims 16 with phenanthrene.

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- A method to oxidize an aromatic compound to a corresponding dihydrodihydroxy compound comprising contacting the aromatic compound with the complex of any one of claims 1 to 13.
- 5 25. A method to oxidize an aromatic compound to a corresponding dihydrodihydroxy compound comprising contacting the aromatic compound with a host cell of claim 16.
- 26. The method of claim 24 or 25 wherein the aromatic compound is indene, 1,2-dihydronaphthalene, benzocyclohept-1-ene, anthracene, phenanthrene, dibenzo[1,4]dioxan, acenaphthylene, naphthalene, biphenyl, fluorene, dibenzofuran, dibenzothiophene, 9,10-dihydroanthracene, or 9,10-dihydrophenanthrene.
- 15 27. A method to prepare cis-1,2-dihydroxyindan comprising contacting indene with the complex of any one of claims 1 to 13, or with a host cell of claim 16.
- 28. A method to prepare 1,2-dihydroxy-1,2,3,4-tetrahydronaphthalene
 20 comprising contacting 1,2-dihydronaphthalene with the complex of any one of
 claims 1 to 13, or with a host cell of claim 16.
 - 29. A method to prepare 1,2-dihydroxy-1,2-dihydrophenanthrene or 3,4-dihydroxy-3,4-dihydrophenanthrene comprising contacting phenanthrene with the complex of any one of claims 1 to 13,or with a host cell of claim 16.
 - 30. The NDO complex of claim 3 having an alpha-subunit that comprises alanine, glutamine, or serine at position 201.
 - 31. The NDO complex of claim 3 having an alpha-subunit that comprises leucine or valine at position 202.

- The NDO domplex of claim 3 having an alpha-subunit that comprises 32. alanine, leucine, or asparagine at position 260.
- The NDO complex of claim 3 having an alpha-subunit that comprises 33. 5 alanine at position 316.
 - The NDO complex of claim 3 having an alpha-subunit that comprises 34. asparagine, arginine, or serine at position 351.
- The NDO complex of claim 3 having an alpha-subunit that comprises 35. 10 alanine at position 358.
 - The NDO complex of claim 3 having an alpha-subunit that comprises 36. alanine at position 362.
 - The NDO complex of claim 3 having an alpha-subunit that comprises 37. tryptophane at position 366.
 - A oligonucleotide comprising any one of SEQ ID No's 37 and 40-55. 38.

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